SIBEC

Sampling and Data Standards

B.C. Ministry of Forests
Site Productivity Working Group
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SIBEC Data Needs

The SIBEC (Site Index/Biogeoclimatic Ecosystem Classification) project was an initiative to develop alternate methods for estimating site index in stands where conventional methods are not suitable. Ecological and site index data from many studies were collated and screened. The resulting SIBEC database is being used to develop relationships between site index and site units of the Biogeoclimatic Ecosystem Classification (BEC) system.

As always, more data is needed to refine these relationships. This document contains data collection and quality assurance standards for projects collecting SIBEC information.

Plot Selection

The procedure for plot selection will depend upon the available ecosystem (site series) mapping for the target Biogeoclimatic units and site series. If there is large scale ecosystem mapping available, use it to identify potential sampling areas and develop a sampling plan, e.g., stratify blocks by site series and then subjectively choose homogeneous and representative plots that contain suitable sample trees. Random sampling is also an option, but probably requires a larger sample size to meet the plot selection and tree selection criteria. If there is limited or no site series mapping available, this precludes forming a sampling frame. Use best available map resources to stratify sampling area and locate plots subjectively. Establish plots using the following criteria:

- site is ecologically uniform and comprised of the target BEC site series
- stand moderately dense (i.e. neither open-grown nor repressed)
- stand not the result of partial cutting
- sample tree between 10 (if a growth intercept model is available) or 20 and 120 years breast height age
- plot centre not within 50 m of a major disturbance (road, harvested area, etc.)
- not affected by non-site factors that may influence site index (e.g., fertilization, repression, heavy pruning)
- contains a site (sample) tree of a target species

The BEC plot size should be a minimum of 314 m^2 (10.0 m radius) and the site index plot size should be 100 m^2 (5.64 m radius). Centre the site index plot as close as possible on the BEC plot centre.

Tree Selection

Select site trees using the following criteria:

- the largest diameter at breast height tree of the target species where breast height is measured on the high side of the tree
- dominant or co-dominant
- free of suppression (above breast height)
- not wolf, open-grown, or veteran
- straight-stemmed, free of disease, insect damage, other significant damage, and breakage (minor damage is allowed but should not occur over more than 5% of total tree height)
- vigorous with a full crown

Field Data Collection

Appendix 1 is a checklist of plot and tree selection criteria as well as digitally required field data. This checklist can be used in the field to ensure that minimum requirements have been met.

The FS212-2 Terrestrial Ecosystem Mapping Ground Inspection Form (GIF) is the accepted minimum standard for collecting SIBEC data. The GIF has the digitally required data fields (with the exception of PLOTAREA, PLOT_SHP, SI_ORIG, and CRWNCLAS) as well as those that will be used for quality assurance. All fields appearing in Appendix 3 must be filled in on the GIF. Original or copies of completed field forms are required at the completion of the SIBEC project. Use of the Ecosystem Field Form (FS882) is an available option for data collection, but quality assessment will be based on the standards set for the GIF (Appendix 3).

Definitions and entry codes for data fields on the GIF (FS212-2) can be found in *Field Manual for Describing Terrestrial Ecosystems* (BC Environment and BC Ministry of Forests 1998).

Data Entry

All fields from the GIF are required digitally. For a few mensuration attributes with no corresponding fields on the GIF, instructions are given in Table 1 on where to enter them. For definitions and descriptions of required SIBEC data fields, refer to Appendix 2.

GIF data can be entered and submitted through a web-based data entry form on MOF Research Branch's homepage: http://www.for.gov.bc.ca/research/. This data entry tool is in development and will be available in Winter 2000 for entering data collected in the year 2000 field season. Contact Shirley Mah (Research ecologist, Research Branch, Shirley.Mah@gems8.gov.bc.ca) prior to beginning data entry for instructions.

Table 1. Digitally Required SIBEC Data

SIBEC Database Field	Field Type	Field Length*	Corresponding field on GIF (FS212-2) form**
For each plot, enter:			
PROJECT	Text	50	PROJECT I.D.
PLOT_ID	Text	15	PLOT #
ZONE	Text	4	BGC UNIT
SUBZONE	Text	3	BGC UNIT
VARIANT	Text	2	BGC UNIT (includes phase)
SITE SERIES	Text	3	SITE SERIES (includes phase)
SLOPE	Number	3	SLOPE
ASPECT	Number	3	ASPECT
ELEV	Number	4	ELEVATION
SMR	Text	3	SMR
SNR	Text	2	SNR
PLOTAREA	Number	3	[enter in NOTES section]
PLOT_SHP	Text	7	[enter in NOTES section]
For the sample tree within the plot, enter:			
TREE	Text	4	[If applicable, enter tree # in margin to left of SPP]
SPP	Text	3	SPP
HT	Number	3	TOTAL HT
AGE	Number	3	BH AGE
SI	Number	2	SI [optional—may be calculated later]
SI_ORIG	Text	25	[if SI calculated, enter information above SI column heading]
CRWNCLAS	Text	1	[enter in margin beside PATH field]

*Maximum field length. Text entries should not be longer than maximum.

** Codes are defined in *Field Manual for Describing Terrestrial Ecosystems* (BC Environment and BC Ministry of Forests 1998)

Quality Assurance

Appendix 3 shows quality assessment criteria that will be used by Ministry auditors. The audit process cannot anticipate all of the variables and thought processes needed to make the most appropriate ecological assessment of a site. The audit process is ultimately dependent on the careful assessment of the site by a competent ecologist as a QA person.

Pass/fail criteria:
A plot may fail if the QA person finds that data crucial to correct ecological interpretations were missing or incorrect. This cannot be stated explicitly in rules as different sites will have different elements that are critical to the interpretation of that particular site.

Guidelines for QA person:
Use the audit form (Appendix 3) and provide additional interpretation about the audit in the comments section. In the comments section, direct the contractor to areas of data collection that require mentoring and improvement. Explain which, if any, errors that are the most significant because of their effect on the interpretation of the site. In the situation where the plot fails even though the maximum number of points was not exceeded, a detailed explanation of the reasons for the plot failure must be provided.

The nature of the collection and evaluation of ecological data is subjective in nature, thus situations may arise where deducting points will require a judgment call by the QA person. In such cases, it is appropriate to provide the reasoning behind the point deduction in question.

Recommended References

Field Manual for Describing Terrestrial Ecosystems. 1998. BC Ministry of Environment, Lands, and Parks and BC Ministry of Forests. Land Management Handbook 25.

Describing Ecosystems in the Field. 1990. Second Edition. BC MOE Manual 11.

Regional Field Guides for Site Identification and Interpretation. BC Ministry of Forests.

Vegetation Inventory Sampling Procedures. March 31, 1995. Resources Inventory Committee.

APPENDIX 1. Field Checklist

PLOT SELECTION	
even-aged	
ecologically uniform (i.e., one site series)	
species composition at least 60% target species	
moderately dense	
no partial cutting	
plot age between 10 (if GI model available) or 20 and 120	
plot centre at least 50 m from major disturbance	
not treated (fertilization, pruning, spacing)	
contains one sample tree per target species	

TREE SELECTION	
largest diameter tree of target species	
dominant or co-dominant	
free of suppression above breast height	
not wolf, open-grown, or veteran	
straight-stemmed, free of disease, and significant damage, or breakage (effect of damage does not exceed 5% of total tree height)	
vigorous with a full crown	

DIGITALLY REQUIRED PLOT DATA (see Table 1)	
PROJECT	
PLOT ID	
BGC ZONE	
BGC SUBZONE	
BGC VARIANT	
SITE SERIES	
SLOPE	
ASPECT	
ELEVATION	
SOIL MOISTURE REGIME	
SOIL NUTRIENT REGIME	
BEC PLOT AREA	
PLOT SHAPE	

DIGITALLY REQUIRED TREE DATA (see Table 1)	
TREE	
SPECIES	
HEIGHT	
BREAST HEIGHT AGE	
CROWN CLASS	

APPENDIX 2. Descriptions of Digitally Required SIBEC Fields (from Table 1)

Field	Description
PROJECT	project identification[a]
PLOT_ID	plot identification number[a]
ZONE	Biogeoclimatic zone
SUBZONE	Biogeoclimatic subzone
VARIANT	Biogeoclimatic variant
SITE SERIES	site series (include phase)
SLOPE	plot slope (%)
ASPECT	slope aspect (degrees)
ELEV	plot elevation (m)
SMR	relative soil moisture regime
SNR	soil nutrient regime
PLOTAREA	plot size of site index plot (m^2)
PLOT_SHP	plot shape of site index plot (circular or quadrangle)
TREE	tree number (if applicable)
SPP	species (three-letter Ministry codes)
HT	tree total height (m)
AGE	tree age (years) at breast height
SI	site index (m/50 yrs) [optional, may be calculated later]
SI_ORIG	name of curve used to calculate SI (e.g. "Goudie, 1984")
CRWNCLAS	crown class (dominant, codominant)

[a]See naming conventions below.

APPENDIX 2. Descriptions of SIBEC Fields (Continued...)

Naming Conventions for Project and Plot Identification

To ensure consistency and minimize data ambiguity, the following naming conventions for projects and plots are recommended:

PROJECT

The project identification field should be filled in with a code conforming to the following convention:

[ADMIN_CODE] – [PROJECT_TYPE] – [PROJECT_YEAR] – [PROJECT_NUM]

where,

ADMIN_CODE:	Alpha-numeric code used to distinguish administrative units such as TFLs and woodlots. Examples: TFL35, TSA14, WL123, ER77, UBC etc.
PROJECT_TYPE:	An acronym or suitable alpha code for describing the project. This may describe the project's objectives, its geographical or biogeoclimatic focus, or perhaps its species focus. Examples: SIBEC, TEM, INV, GI_Fd, IDF_Fd etc.
PROJECT_YEAR:	Four digit year. Examples: 1999, 2000, 2001 etc.
PROJECT_NUM:	Optional. Use if multiple projects exist for the same ADMIN_CODE, PROJECT_TYPE, and PROJECT_YEAR. Always prefix with "PROJ" or some other prefix that cannot be confused with a plot number. Examples: PROJ001, PROJ002, PROJa, PROJb, etc.

Some examples of full Project IDs:

TFL35-SIBEC-1998
UBC-ESSFSe-KAYAHARA-1999
ER77-FdREGEN-1998
TSA14-TEM-1998-PROJ001
TSA14-TEM-1998-PROJ002

PLOT_ID

A unique plot number is required for the GIF (FS212-2). You may submit your own plot numbering scheme provided it is unique (e.g., TFL35-S001 which contains information that data are from TFL35 as well as a modifier (S) suggesting the type of project). The web-based data entry form allows the complete PSP id for Resource Inventory Branch's Permanent Sample Plots to be entered.

APPENDIX 3. FS212-2 Ground Inspection Form* (GIF) – Quality Assessment Criteria

Note: Point Total that exceeds Maximum Acceptable Deduction in any single block or the grand total of the Ecology Data block constitutes an unacceptable plot.

Ecological Data

DATA FIELD	DATA TYPE	COMMENTS AND DEDUCTIONS	Plot number: / Acceptable (Y/N)	
HEADER	Date	no errors allowed		
	Plot #	no errors allowed		
	Project ID.	no errors allowed		
	Surv.	no errors allowed		
LOCA-TION	Mapsheet	no errors allowed		
	Lat. / Long. or UTM	no errors allowed		
	Air photo no.	no errors allowed		
BEC CLASSIF.	BGC Unit	-10 if incorrect, -5 for incorrect or missing transitions		
	Site Series	-10 if incorrect, -5 for incorrect or missing transitions		
	Site Diagram	-2 for lack of adequate diagram		
	Notes	-2 for inadequate explanation of complex variation		
	Maximum Acceptable Deduction: 7		**TOTAL**	
SITE and SOIL	Elevation	-2 if >± 50m from actual		
	Slope	-2 if >± 10% from actual		
	Aspect	-2 if >± 15 degrees from actual		
	Meso Slope Pos.	-1 if out by 1 class, -3 if out by 2 or more		
	Moist. Regime (SMR)	-2 if out by 1 class, -5 if out by 2 or more		
	Nutr. Regime (SNR)	-1 if out by 1 class, -3 if out by 2 or more		
	Surface Org. Hor. Thk.	-3 if incorrect class		
	Min./Org. Soil Texture	-3 if out by 1 class, -5 if out by 2 or more		
	% Coarse Frags.	-3 if out by 1 class, -5 if out by 2 or more		
	Drainage – Min. Soils	-2 if out by 1 class, -5 if out by 2 or more		
	Root Restr. Type	-1 if incorrect type, -4 if missed		
	Root Restr. Depth	-2 if depth >± 5cm from actual		
	Terrain Classif.	-2 if incorrect surficial material, -2 if incorrect surface expression		
	Humus Form	-2 if incorrect Order		
	Notes	Must have comments if significant exposure, gleying etc.		
	Maximum Acceptable Deduction: 10		**TOTAL**	
VEGETA-TION	Species list	-2 for each species ≥ 1% cover missed or misidentified -2 for each site series indicator species < 1% cover missed or misidentified		
	All Species Covers	-1 if >± 10% when actual >10% or >± 2% if actual < 10%		
	Total % A	-1 if >± 10% when actual >10% or >± 2% if actual < 10%		
	Total % B	-1 if >± 10% when actual >10% or >± 2% if actual < 10%		
	Total % C	-1 if >± 10% when actual >10% or >± 2% if actual < 10%		
	Total % D	-1 if >± 10% when actual >10% or >± 2% if actual < 10%		
	Maximum Acceptable Deduction: 8		**TOTAL**	
Maximum Total Acceptable Deductions: 17			**GRAND TOTAL**	
Comments				

* Standard for each attribute as defined in *Field Manual for Describing Terrestrial Ecosystems* (BC Environment and BC Ministry of Forests 1998).

APPENDIX 3. FS212-2 GIF* Quality Assessment Criteria (Continued)

Mensuration Data

DATA FIELD	DATA TYPE	COMMENTS AND DEDUCTIONS	Plot number: / Acceptable (Y/N)
TREE MEASURE-MENTS	Tree selection	-5 if site tree does not meet sample tree selection criteria	
	Ht. to DBH (1.3 m)	-5 if > 5 cm from actual (taken on high side of root collar)	
	DBH	-5 if error > 0.1 cm or 1%, whichever is greater	
	Total Tree Height	-5 if error > 20 cm or 2%, whichever is greater (for height pole, -5 if > 10 cm or 1%, whichever is greater)	
	BH Age	Sample must include pith; no error allowed if bha ≤ 50; 1 year error allowed if bha = 50 to 100; 2 year error allowed if bha > 100	
	Notes	Must have comments where accepting a damaged sample tree	
	Maximum Acceptable Deduction: 4	**TOTAL**	

* Standard for each attribute as defined in *Field Manual for Describing Terrestrial Ecosystems* (BC Environment and BC Ministry of Forests 1998).